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REPORT ON SAND CREEK BEETLE CONTROL PROJECT for Season 1928

Crater National Forest

1. Name of Project Area and Units Treated

This is known as the Sand Creek Beetle Control Project and lies in Secs. 27 and 28, 33 and 34 of T 31 S, R 7½ E, and Secs. 3 and 4 of T 32 S, R 7½ E, and borders the Sand Creek highway into Crater Lake National Park.

This report covers the work done for the season of 1928. A new area of 255 acres north of Sand Creek and between Cave Creek and the National Park and Forest boundaries was treated. This is the area which was not treated last year because of lack of funds. In addition, 75 acres north of Sand Creek Canyon and 150 acres south of the canyon worked in 1927 were reworked this season. See attached map.

2. Ownership

The entire area worked was within the Crater National Forest and is Government land. Along the inter-forest and park boundary groups of infested trees were completely cut out regardless of their location on either side of the boundary line in order to make control effective.

3. History of Infestation and of Control

This is a part of a widespread infestation of Dendroctonus monticolae, mountain pine beetle, in lodgepole pine which extends from the Diamond Lake area to Crater Lake. The infestation probably had its inception in the large lodgepole pine flats north of Crater Lake in which almost every pine has been killed above sapling size and from which the infestation has spread for miles in all directions with varying intensity.

The infestation is group wise and seems to concentrate in the areas of older lodgepole pine. The infestation was particularly bad along the Sand Creek Canyon road which was of high scenic value in connection with the pinnacles at the park and forest boundary. Work was undertaken in 1925, 1926 and 1927 by the Park Service in the park area and work was done in 1927 and 1928 in the Forest area in an effort to create an isolation zone and save the timber along the road and canyon. The work for the 1928 season was a follow-up of the work for the 1927 season on the National Forest area.

The present work on the Forest was undertaken at the request of the Park Service in order to make the control work done by them effective and not vitiate their control by leaving badly infested areas in adjoining lands.

3. Organization of control work

In order to be effective, beetle control work must be done jointly in the Park and Forest area. Future work should be coordinated and work done only if the control is sustained by a continuation of similar work in the adjoining forest or park area.

Camps may be established at the Park entrance or at Lost Creek in the Park and at one or two points on the Sand Creek Highway in the Forest. A small crew of 20 to 30 men seems to be the most effective for this work. In any case, water has to be hauled for all camps on the Forest as no springs or streams are available.

In 1927 camp was established between May 20 and 25 on from 2 to 4 feet of snow. The cost of this camp was from two to three times greater than the cost of establishing the camp for 1928. This season's camp was opened on May 17 at the edge of Sand Creek Canyon. No snow was encountered in the work. Snow conditions vary from year to year and may make as high as 20% difference in the unit cost of the project.

Camp was opened with Lee P. Brown in charge of the crew. Spotting was done underthe direction of Homer Wakefield, a student from Iowa State Forestry School, who was trained by Forest Examiner A.J. Jaenicke in 1927 for this work. The crew consisted of:

1 cook at	$35	per mo.
1 flunkey at	55	" "
1 saw filer and wood buck at	3.50	day
2 spotters at	5	"
1 compass man (Wakefield) at	4	"
14 laborers at	3	"

All received their board in addition which cost an average of $1.30 per day.

4. Methods of Accomplishing Work

The spotting work was done by the strip method, a compassman mapped in infested trees by strips run from base lines. Each strip was 5 chains wide, each spotter covering 2½ chains on opposite sides of the compassman. Experienced spotters were not available. Mr. Wakefield did a good job with the material available. The work was necessarily slower because of the inexperience of the men. On virgin ground, 170 to 200 trees per day were spotted or 85 to 90 per man-day. On re-worked ground, 130 trees were spotted per day per crew, or 65 trees per man-day for the spotters. Had experienced spotters been available the work would have progressed much faster. For new ground approximately 55 acres per day was spotted, and for re-worked ground 90 acres per day.

The trees were treated by the solar heat method of sun curing without peeling. Several hot days were experienced and one in particular was accompanied by a hot dry wind. Trees were treated by a 3-man crew, 2 men felling the trees north and south and peeling the stumps, while the third man swamped out all limbs and left the tree bole exposed to sunlight. The top was cut off where test showed a bright top free from insect work and was left unswamped. A secondary infestation in the tops of Ips, which in some of the smaller trees was intermingled

with the work of Dendroctonus, was found. It was found that the sun was hot enough to kill the Ips so that the trees were swamped out far enough to include all Ips work as well as Dendroctonus. Two to five days after falling the trees were turned by a log-rolling crew of two men. Funds did not permit rolling all logs felled so that no trees cut south of the canyon were turned. However, they were swamped clear so that about two-thirds of each tree will be sun-cured.

The crews treated from 30 to 59 trees per day, or an average of about 40 trees per day or 1.5 trees per man-day. This is slightly less than was done in 1927, but three factors reduced the average:

1. The long walk and stiff climb into and out of Sand Creek Canyon, as the bulk of the work lay across the canyon with no means of establishing a camp on that side.
2. The lighter infestation and reworking of ground previously worked over.
3. The open growth and generally larger and limbier timber worked in this year reduced the average cut.

Falling covered 65 man days of labor
Swamping " 26 "
Turning " 15 "
Spotting " 20½ "

Crew, materials, equipment and supplies were taken from the Forest Service garage at Medford. This is the most practical base of operation. Enough trucks were taken to carry the complete outfit in one trip. If snow were encountered, a tractor and sled would be necessary to make camp, doubling the cost of establishing camp and increasing transportation. Camp was a tent camp with roughly constructed tables and benches for the cookhouse. Cots and mattresses were taken from Medford.

5. Amount of Work Accomplished

The following table gives the number of trees and acreages treated:

TABLE I

	Acres Cov.	Number of Trees Spotted	Cut & Swamped	Turned	Average No. Trees
New ground north of canyon	255	870	930	910	3.5
Reworked ground north of canyon	75	148	168	168	2.0
" " south "	150	149	159	0	1.0
Total	480	1167	1257	1078	

TABLE II

	Number of Trees in largest group		Average number of Trees in Each Group	
	1927	1928	1927	1928
New ground north of canyon		44		7
Reworked ground north of canyon	86	24	16	4
" " " S.of Sand Cr. "	402	30	20	3

For Table II the figures for 1927 are not exact but represent the memory and judgment of the Forest Officer in charge. They are approximately correct.

Two inspections were made of the area south of the Canyon which funds did not permit reworking. One group of about 30 trees was found and a number of smaller groups varying from 10 to 20 trees. Scattered trees were found throughout. The figures given are based on this inspection. Proportionately the area not worked has no heavier infestation than the area which was worked.

As will be seen from the attached cost analysis, the items of transportation and camp establishment make up about 40% of the total cost and only 60% can be said to be spent in effective work. Had additional funds been available for labor and subsistence the items of transportation and camp would have been no more as the crew could have remained an additional week without increasing the non-effective charges. This would have decreased the cost per tree and would probably have made future work within the zone already worked unnecessary.

6. Cost of the Work

The following table gives the total cost of the allotment:

Cost Statement Sand Creek Beetle Project 1928
Crater National Forest

Total Allotment			$1,000
	Charge in $s	% of Cost	
a. Supplies			
Foodstuffs and meals	228.21	22.8	
Camp and work equipment	27.63	2.8	
b. Transportation			
Gas and oil and mileage on government trucks	191.05	19.1	
c. Labor			
Establishing camp	51.25	5.1	
Woods work			
Spotting	68.50	6.9	
Falling and Swamping	267.00	26.7	
Burning	47.00	4.7	
Sub-total woods work	382.50	38.3	
Breaking camp	15.25	1.5	
Truck driver's time	43.17	4.3	
Cook house labor	60.84	6.1	
Total labor bill	552.01		
Grand total expenditures			$1,000
Balance			

Cost Analysis

Cook house charges - Supplies - $228.31 Meals served - 566
Labor 60.84
Total $289.15 Cost per meal - 43.4 cents
" man day-$1.302

The following costs apportion the cook house costs to the various activities and show the relation of camp establishment and transportation to effective work;

Table IV

	Total Allotment Cost: Amount	% of Whole	Contributed Time: Days	Value
Equipment	$27.65	2.8	1½	11.25
Transportation including meals en route	255.92	25.6	2	15.00
Establishing camp	81.65	8.2	2	15.00
Breaking camp	23.50	2.5	1½	11.25
Sub-total	388.68	38.9	7	52.50
Spotting	95.84	9.6	1½	11.25
Falling and Swamping	443.31	44.3	6½	48.75
Turning	72.17	7.2	1½	11.25
Sub-total	611.32	61.1	9½	71.25
Total	$1,000.00	100.0	16½	123.75
Office Work			3	22.50
Total of Contributed Time			19½	$146.25

All supplies were purchased on government bid. The staple foodstuffs came from a general order from Lang and Co. of Portland. Meats, eggs etc. were purchased locally on formal bids. It was necessary to cut wood for the cookhouse and to haul water for all camp use. The latter was charged to the cookhouse and ran up the cost considerably.

Forest officer's time on this project in general supervision and work is also included in this table as contributed time.

Some equipment was purchased which was needed for the camp, and upon return some purchased to replace equipment worn or broken on the job. The total amount was small.

Following is a table giving the cost per tree of the effective work done. This cost represents only the actual labor and cookhouse charges for the time covered in effective work.

Table V

	Cost of Effective Work, viz., Treating Only: Cost	No. Trees	Cost per tree	Ratio %
Spotting	$95.84	1157	$0.08212	16.37
Swamping and Falling	443.31	1257	0.35267	70.29
Turning	72.17	1078	0.06695	13.34
Total	$611.32	1218	$0.50174	100.

For reworked ground the following figures included in the above are segregated:

	Cost	No. Trees	Cost per tree	Ratio %
Spotting	$27.80	297	$0.093	
Falling and Swamping	92.15	327	0.283	
Turning	8.31	168	0.050	
	$128.27		0.426	

One reason for the low cost of the reworked ground was the fact that all the work was close to camp and a maximum of work was secured. The men particularly dreaded crossing the canyon and would work better when not confronted with the need of crossing Sand Creek Canyon twice a day.

In order to determine the actual cost of the project it is necessary to pro rate the non-effective work of transportation, establishing and breaking camp and the like, as well as to spread the cost of equipment. At the same time where the number of trees treated varies, it is necessary to determine what this is for each operation in treating and to arrive at an average or balanced figure of the number of trees treated based on the proportionate cost of each step in treating. This is done in the following table:

Table VI

Project Costs

	Cost-total	No.Trees Treated	Cost per tree
Spotting	$153.70	1167	$0.1405
Falling and Swamping	702.90	1257	0.5592
Turning	133.40	1078	0.1237
Subtotal	$1,000.00	1215	$0.8232
Supervision-contributed time	138.75	1215	0.1142
Total Cost	$1,138.75	1215	$0.9374

7. Average Costs

The cost per tree was $0.8232 for a balanced average of 1215 trees treated.

The cost per acre treated was approximately $2.10 per acre, or the equivalent of 2.6 trees per acre.

Very few trees were found in the canyons of either Sand Creek or Cave Creek proper so that it did not pay to treat these. The heaviest portion of the infestation was checked in the work done in 1927 so that the work for 1928 merely aids in increasing the isolation zone and make the work already done more effective. The area affected by the work of 1928 is approximately one section or 640 acres.

The cost per man day of treating labor is $8.00.

The cost per man day of total labor is $6.73. This cost includes the cost of the cookhouse, truck drivers, cooks and equipment, mileage, gas and oil, or put another way, labor for treating and for breaking and establishing camp cost $6.73 per day.

8. Conclusions and Recommendations

There is need for another season's work in the area treated during 1927 and 1928. In all probability it will cost not less than $1500 to effectively cover the area and if snow conditions are encountered it may cost more. This should complete the work for a period of years at least. There should be a similar clean-up of areas within the park at the same time. Any allotment which does not permit covering the necessary area of approximately two sections will necessitate work in

succeeding years and will increase the cost of the work and project because a disproportionately large share of small allotments is lost in establishing camp and in transportation charges. The present year's operations were about a minimum for an economical operation.

While part of a large general infestation in the lodgepole pine belt, the area treated has natural barriers which tend to make control work effective. To the west is the Park boundary which divides the infested area under treatment and which connects with the general infestation in the park though Mt. Scott with its large areas of fir acts as a partial barrier to spread of infestation. North of the National Forest area treated lies an open burn in which there are only scattered saplings and no infestation. Beyond this burn, which is approximately one-fourth mile across, there is only a light scattered infestation. To the east Cave Creek Canyon forms a barrier one-fourth to one-half mile across. Very little infestation is found along the east rim of the canyon as the type changes to a mixed western yellow pine-lodgepole pine type. Sand Creek Canyon has very little beetle work in it. To the east, south of Sand Creek Canyon, lies an uninfested area of lodgepole pine saplings, poles and trees. The timber is open and scattered and any infestation is necessarily light. The same thing is true to the south but to a lesser extent as the lodgepole pine to the south ties up with the park areas. However, Grayback Ridge in the park is largely fir and acts as a partial barrier to the spread of any infestation. The area treated should offer adequate protection to the Sand Creek road and to the scenic values involved along Sand Creek Canyon.

In 1927 special care was taken to pile and burn the brush and tops from all treated trees within 100 feet of the Sand Creek road. This was because people frequently get out to look at the canyon and to prevent passers-by starting a forest fire in the slash. At that time it was recommended that in the construction of the Sand Creek highway all slash from beetle tops along the new road be piled and burned, and that provision for this be made in the road contract. This was not done. The new road cuts through two large groups of beetle trees treated in 1927 besides a number of smaller groups. All beetle trees ~~treated in 1927~~ be cut in 1928 along or near the road were disposed of so as to create no hazard. The 1927 slash, especially in the two large groups, represents an extreme hazard insofar as the condition of the slash is concerned. If fire ever starts in these it will be extremely difficult to control and will largely vitiate the work done in beetle control during the last two years as well as destroy the scenic attractions the work was undertaken to preserve. One hundred dollars would pay for clearing the brush at the danger points for 50 feet back from the road and would pay well in added protection.

Lee P. Brown,
Administrative Assistant,

Crater National Forest,
Medford, Oregon,
June 16, 1928.